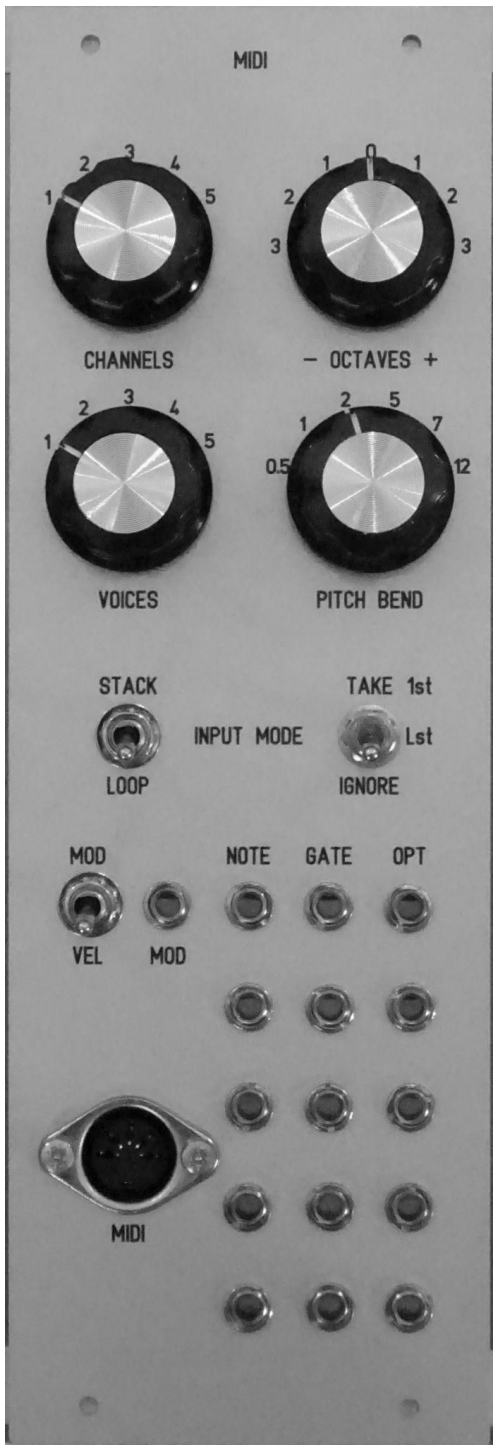
Midi Module Manual

A Midi to CV converter with an integrated arpeggiator and sequencer.

Contents

1.1 Panel Layout Controls

The panel layout is repeated to the left. Some of these switches are resetting (marked with *), meaning that they clear all playing notes when changed.



- The ***CHANNELS**** switch controls the number of active channels to distribute over the outputs.
- The ***VOICES**** switch controls the number of voices to assign to each channel if possible.
- The ***OCTAVES*** switch controls the applied octave offset used on note outputs.
- The ***PITCH BEND*** switch controls the +/- semitone range of the pitch wheel.
- The two ***INPUT MODE**** switches affect how the pressed notes should be distribute over the outputs. Specifics on these can be found in **1.2.2**.
- The ***MOD/VEL*** switch determines the function of the ***OPT*** output ports and the ***MOD*** output port.
- The ***MIDI*** connector is a standard 5-pin midi connector used to control the module.
- The ***NOTE*** outputs provide 1 volt per octave note CV with 0V representing A0 (the lowest key on an 88 key piano).
- The ***GATE*** outputs are binary ON/OFF for each respective note outputs.
- The ***OPT*** outputs by default follow the ***MOD/VEL*** switch, but can also be programmed to other functions (see **4.1**)

1.2 Basic Functions of the Module

The default positions as shown in the images will setup the module in its most basic operation, a monophonic synthesiser that priorities new notes. This would suffice most operations however the module has a lot more to offer.

1.2.1 Channels and Voices

The first options allow for a polyphonic or multi instrument configuration, which given the feature set of the rest of the synthesiser, will likely be used often. However, there are only 5 outputs available, so not all channels can be polyphonic at once. A table of how each port is assigned is shown below, with the numbers representing *channel*/*voice*. This table changes slightly when *Alternate Slots* is enabled (see **2.2.4**).

Config	**1/1**	**1/2**	**1/3**	**1/4**	**1/5**	**2/1**	**2/2**	**2/3**	**2/4**	**2/5**	**3/1**	**3/2**	**3/3**
Port 1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Port 2	1/1	1/1	1/1	1/1	1/2	1/1	1/1	1/2	1/2	1/2	1/1	1/2	1/2
Port 3	1/1	1/1	1/2	1/2	1/3	1/1	1/2	1/3	1/3	1/3	2/1	2/1	1/3
Port 4	1/1	1/2	1/2	1/3	1/4	2/1	2/1	2/1	1/4	1/4	2/1	2/2	2/1
Port 5	1/1	1/2	1/3	1/4	1/5	2/1	2/2	2/2	2/1	2/1	3/1	3/1	3/1

Config	**3/4**	**3/5**	**4/1**	**4/2**	**4/3**	**4/4**	**4/5**	**5/1**	**5/2**	**5/3**	**5/4**	**5/5**
Port 1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Port 2	1/2	1/2	1/1	1/2	1/2	1/2	1/2	2/1	2/1	2/1	2/1	2/1
Port 3	1/3	1/3	2/1	2/1	2/1	2/1	2/1	3/1	3/1	3/1	3/1	3/1
Port 4	2/1	2/1	3/1	3/1	3/1	3/1	3/1	4/1	4/1	4/1	4/1	4/1
Port 5	3/1	3/1	4/1	4/1	4/1	4/1	4/1	5/1	5/1	5/1	5/1	5/1

1.2.2 Input Modes

The ***STACK/LOOP*** switch controls how new notes are assigned to open voice slots. This means it has no effect in monophonic mode. If all voice slots are being used, then the other input mode option is used to determine how to manage the new note.

- ***STACK:*** New notes are assigned to the lowest available slot.
- ***LOOP:*** New notes are assigned to the next available slot after the one that was played. The order specifically goes in play order, prioritising the slot that has been available for the longest. This is useful when playing consecutive single notes with long release times, as it will not cancel the release until necessary.

The three way switch controls when new or old notes are prioritised when all voice slots are already taken. It also controls which note in the queue should be re-outputted when a note is released. With *Sort Mode* enabled (see **2.1**), this then controls whether higher or lower pitched notes are chosen.

- ***TAKE 1st:*** New notes override the most recent note played. This results in the oldest notes plus one newest to be outputted.
- ***TAKE Lst:*** New notes override the least recent note played. This results in the newest notes played being outputted.
- ***IGNORE:*** All new notes are ignored and only the oldest notes played are outputted.

By default, when new notes override an existing one, the gate is retriggered, however when an old note is filling the slot of a released note, no retrigger is applied. This can be changed with *Retrig Old* in the special options menu (see **2.1**).

1.2.3 Modulation and Velocity

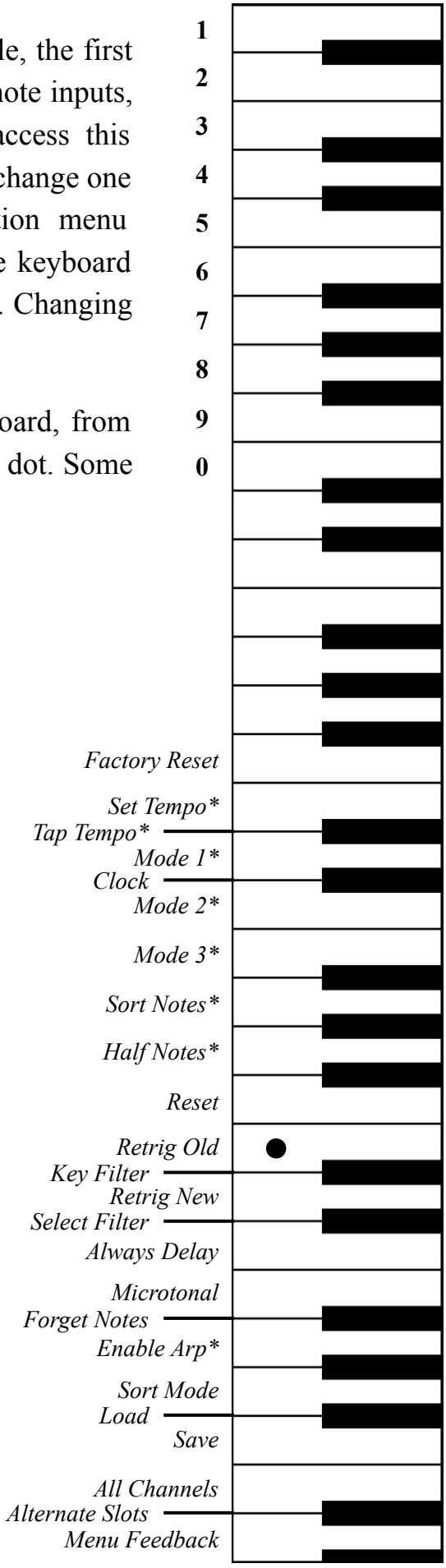
The ***OPT*** port by default outputs the velocity of the respective note being played, and the ***MOD*** port outputs the value of the modulation wheel for channel 1. The ***MOD/VEL*** switch can swap these so that the modulation of multiple channels can be used, whilst only the velocity of voice 1, channel 1 outputs to the ***MOD*** port.

Note that the functions of these ports are overridden by the settings in the programmable ports menu, regardless of state of the switch.

2.1 Special Options Menu Layout

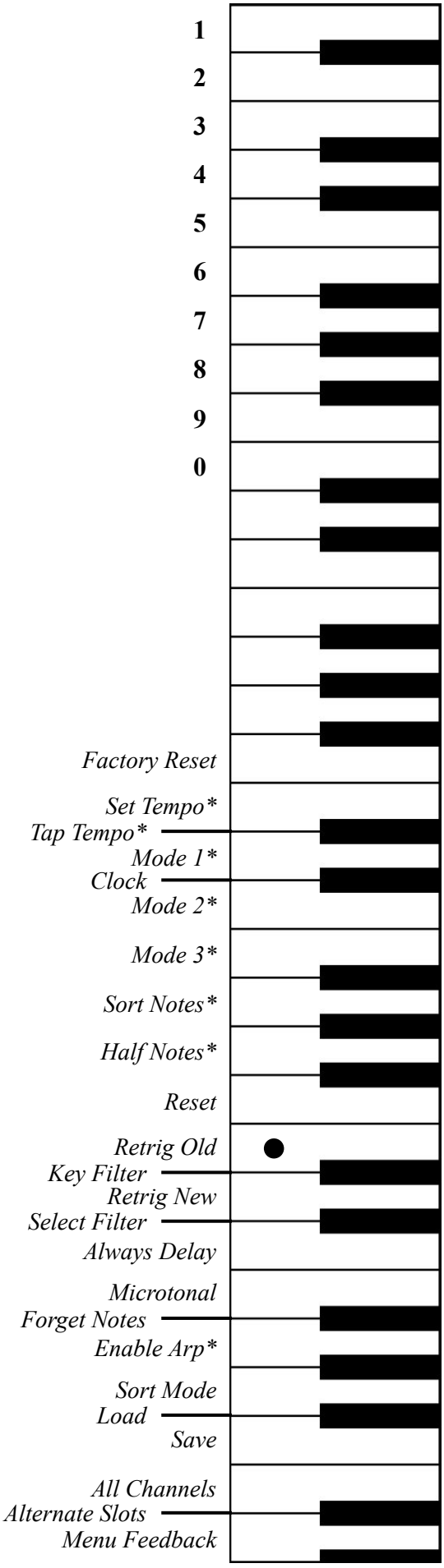
There are multiple hidden menus within the module, the first providing additional configurations for managing note inputs, as well as including the arpeggio options. To access this menu, press A0 (lowest note on 88 key piano) and change one of the resetting switches (see **1.1**). The Selection menu feedback will play (see **2.2.1**) and the keys on the keyboard will now change parameters rather than play notes. Changing a resetting switch again will then exit the menu.

To the left displays a portion of a full sized keyboard, from A0 to D#5. C4 (middle C) has been marked with a dot. Some options are channel specific (marked with *).



- A0 - C2 are used to input numbers when required (see **2.2.3**).
- *Factory Reset* clears all saved data then saves defaults for all menus (see **2.2.2**).
- The parameters between C3 - A3 are the arpeggio options.
    - *Set Tempo** uses the number inputs to set the tempo of the arpeggio (see **2.2.3**).
    - *Tap Tempo** is pressed twice to set the tempo to the rate pressed (see **2.2.3**).
    - *Mode* 1, 2, 3* sets the traversing mode to their respective values.
    - *Clock* causes all arpeggios to be synced to the midi input clock.
    - *Sort Notes** causes the order of the notes to be lowest to highest.
    - *Half Notes** sets the arpeggio to turn off the note halfway before the next note is played.

- *Reset* sets all values in the menu to their default (see **2.2.2**).
- *Retrig Old* enables the gate to be retriggered when existing notes fill an open slot.
- *Key Filter* enables note filtering by key.
- *Retrig New* enables the gate to be retriggered when new notes override existing ones.
- *Select Filter* selects the key to be used for filtering, C1 - B1 (see **2.2.3**).
- *Always Delay* sets all note plays to include the retrigger delay before being outputted.
- *Microtonal* mode causes each semitone to become a quarter tone, with C4 remaining the same pitch.
- *Forget Notes* causes old notes that are not being outputted to be forgotten.
- *Enable Arp** enables the arpeggio for the channel the note was played on.
- *Sort Mode* causes incoming notes to be sorted by pitch rather than play order.
- *Load* loads the settings saved in flash.
- *Save* saves the current settings to flash. These will be loaded on startup.
- *All Channels* mode causes any incoming note data not on one of the used channels to be output to the modulo of ***CHANNELS***.
- *Alternate Slots* enables alternative slot allocation layouts for some combinations (see **2.2.4**).
- *Menu Feedback* enables and disables the menu feedback across all menus (see **2.2.1**).



2.2 Option Functions

2.2.1 Menu Feedback

When using the menu, the module will play notes on relevant channels to give feedback on the changes. Non-channel specific will be sent to all slots. The table below gives information on what each possible note means. Selection means that the user has to input a number or key, Other is used for general acknowledgement. The Microtonal mode and Vibrato will affect the pitch of any menu feedback played.

Info	Fail	ON	OFF	Selection	Other
Note	B1	C4	G3	C3	G4

2.2.2 Default Values

The default values of each configuration option are shown in the table below. These are the values set when *Reset* is pressed. The values loaded on startup however are the ones stored in flash after *Save* in pressed.

A full factory reset can be performed by pressing the *Factory Reset* button 3 times in a row. This will clear all saved data across the module, including sequencer tracks, and write the default values to the flash storage.

Option	**Value**	**Option**	**Value**	**Option**	**Value**
*Tempo**	240	*Arp Mode**	1	*Clock*	OFF
*Sort Notes**	ON	*Half Notes**	OFF	*Retrig Old*	OFF
Key Filter	OFF	*Retrig New*	ON	*Filter*	C
Always Delay	OFF	*Microtone*	OFF	*Forget Notes*	OFF
*Enable Arp**	OFF	*Sort Mode*	OFF	*All Channels*	OFF
Alternate Slots	OFF	*Menu Feedback*	ON		

2.2.3 Using the Menus

Some options in the menu require further input and these trigger the Selection menu feedback (see **2.2.1**). *Set Tempo* uses the numbers shown in **2.1** from A0 - C2. Values are entered by pressing the keys in the order of digits, leading 0s are not necessary, up to a maximum of 4 (no menu feedback will be given after that point). Pressing the *Set Tempo* key again finalises the value. Not entering any digits results in the previously entered value being used, and entering a value less than 10 is invalid and triggers the Fail menu feedback. Entering numbers causes menu feedback with the matching note 3 octaves higher and an invalid key triggers the Fail menu feedback (see **2.2.1**). Changing a resetting switch (see **1.1**) will cancel any number input operation.

Select Filter is different from *Set Tempo* as it does not require repressing for the value to be entered. After pressing *Select Filter*, pressing any key from C1 - B1 will select that major key to be the filter. To select a different modes, you can press the corresponding major key that results in the exact same notes (see **6.1**). Pressing *Select Filter* again after not entering a key will cancel the operation. Entering the key triggers a menu feedback with the matching note 3 octaves higher and an invalid key triggers the Fail menu feedback (see **2.2.1**).

Tap Tempo sets the tempo value to relative to the duration between note presses. Once it is pressed, any key can be used as the closing press. A shorter menu feedback duration is used for these and the Other menu feedback is played for each press (see **2.2.1**).

2.2.4 Alternate Slot Allocations

The changes to the channel-voice table (see **1.2.1**) when alternate slot allocations is enabled is shown to the left. Each port's output numbers represent the *channel*/*voice* of the slot. The rest of the original table is unchanged by this option.

Config	**1/2**	**1/3**	**1/4**	**2/2**
Port 1	1/1	1/1	1/1	1/1
Port 2	1/2	1/2	1/2	1/2
Port 3	1/1	1/3	1/3	1/1
Port 4	1/2	1/1	1/4	2/1
Port 5	1/1	1/2	1/1	2/2

2.3 Arpeggio Functions

All arpeggio settings are per channel, except for *Clock* which causes all arpeggios to be synced with incoming midi clock data. In this mode, the arpeggios do not work if there is no standard clock data sent.

The *Tempo* of each arpeggio is the actual bpm of the notes, as in each note is a normal crochet (this differs from the sequencer). In *Clock* mode, the notes are all semiquavers relative to the midi clock bpm.

The *Arp Mode* controls the order of traversal for the arpeggio. Mode 1 is ascending notes only, Mode 2 is descending notes only and Mode 3 is ascending then descending, without note repeats at each end.

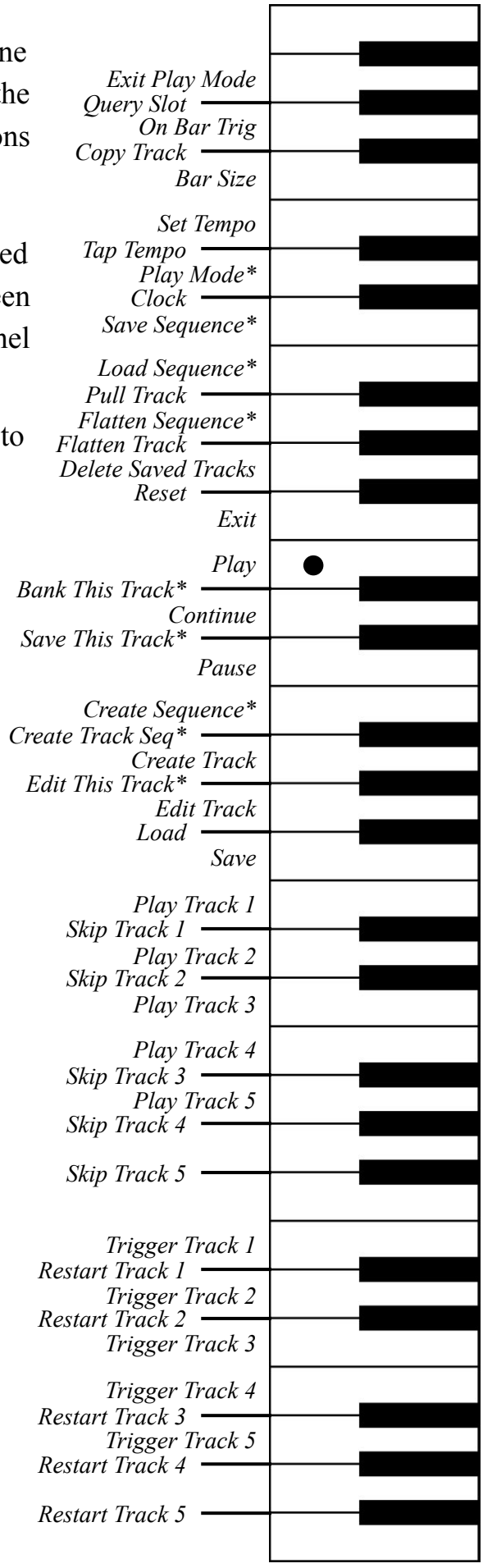
With *Sort Notes* enabled, the *Arp Mode* traverses through the order of note value, lowest to highest. With it disabled, *Arp Mode* traverses by play order, oldest to newest.

Half Notes causes the gate to disable halfway between one note and the next. Otherwise the notes are held constant and only retriggered at each change.

3.1 Sequencer Menu Layout

To access the sequencer, press B0 and change one of the resetting switches (see **1.1**). The keys on the keyboard will now have certain functions described below.

To the left displays a portion of a full sized keyboard, from F2 to B6. C4 (middle C) has been marked with a dot. Some options are channel specific (marked with *).



- *Exit Play Mode* returns all channels to inputting menu functions.
- *Query Slot* uses the slot menu to provide feedback for whether a saved track slot is empty or not (see **3.2.3**).
- *On Bar Trig* causes certain functions to be applied on the next bar during play.
- *Copy Track* uses the slot menu to copy and paste tracks in the memory bank (see **3.2.3**).
- *Bar Size* uses the number inputs to set semiquaver count in one bar that *On Bar Trig* aligns to (see **3.2.4**).
- *Set Tempo* uses the number inputs to set the tempo of the sequencer (see **2.2.3**).
- *Tap Tempo** is pressed twice to set the tempo to the rate pressed (see **2.2.3**).
- *Play Mode** temporarily closes the menu to be able to play notes whilst a sequence is running.
- *Clock* causes the sequencer to synced to the midi input clock.
- *Save Sequence** uses the slot menu to save the current channel's sequence to flash (see **3.2.3**).

- *Load Sequence** uses the slot menu to load a sequence from flash (see **3.2.3**).
- *Pull Track* uses the slot menu to load a track saved in flash to the memory bank (see **3.2.3**).
- *Flatten Sequence** attempts to save all tracks used by the current sequence to flash.
- *Flatten Track* uses the slot menu to save a track from the memory bank to flash (see **3.2.3**).
- *Delete Saved Tracks* uses the slot menu to delete tracks saved in flash (see **3.2.3**).
- *Reset* sets all global sequencer values to their default (see **3.2.1**).
- *Exit* exits the sequencer menu.
- *Play* starts playing the setup sequence from the start.
- *Bank This Track** uses the slot menu to save the track that was being played by the current sequence to the memory bank (see **3.2.3**).
- *Continue* starts playing the sequence from the last paused position.
- *Save This Track** uses the slot menu to save the track that was being played by the current sequence to flash (see **3.2.3**).
- *Pause* pauses the sequence if playing.
- *Create Sequence** uses the sequence menu to create a new sequence (see **3.3**).
- *Create Track Seq** uses the track menu to create a sequence with a single new track (see **3.3**).
- *Create Track* uses the track menu to create a track and save to a space in the memory bank (see **3.3**).
- *Edit This Track** uses the track menu to edit the track that was being played by the current sequence (see **3.3**).
- *Edit Track* uses the track menu to edit a memory bank track (see **3.3**).
- *Load* loads the settings saved in flash.
- *Save* saves the current settings to flash. These will be loaded on startup.
- *Play Track X* enables/disables playing of the channel *X* sequence.
- *Skip Track X* increments the skip count of the channel *X* sequence.
- *Trigger Track X* stops the sequence of channel *X* after one play through.
- *Restart Track X* resets the sequence position of channel *X* to the first track.

3.2 Sequencer Functions

3.2.1 Default Values

The default values of each configuration option are shown in the table below. These are the values set when *Reset* is pressed. The values loaded on startup however are the ones stored in flash after *Save* in pressed.

Option	**Value**	**Option**	**Value**	**Option**	**Value**
Tempo	120	*Clock*	OFF	*On Bar Trig*	ON
Bar Size	16				

3.2.2 Sequences and Tracks

A track is a set of note and modulation data with some extra information on how to play them. A sequence is a collection of tracks that play in order and there is one sequence loaded per channel (up to 5) at a time. A sequence can either reference a track in isolation (loaded straight from flash or created via *Create Track Seq*) or a memory bank track.

The memory bank is a set of 32 slots for track manipulation. They will not automatically be saved to flash, but sequences that use a memory bank track reference the slot specifically, not the track itself. So if a track is overridden in the memory bank, all sequences that refer to that slot will also change.

Tracks and sequences can be saved to flash; there are 32 track slots and 16 sequence slots. When a sequence is saved to flash, it stores references to tracks saved in flash, so if a particular track slot is overridden or deleted, the sequence will load incorrectly.

3.2.3 The Slot Menu

Certain functions use the slot menu to access tracks in the memory bank or flash. The menu uses the white notes A0 - D5 to select slots 1 - 32. When a valid slot menu button is pressed, the corresponding note 2 octaves up is played as menu feedback (see **2.2.1**). If the function fails, or an invalid note outside the range is pressed, the Fail menu feedback is triggered and the operation is cancelled. Any slot menu operation can also be cancelled by changing a resetting switch (see **1.1**). For most functions, the slot menu closes after the operation has been performed.

Below gives some more information about each slot menu function.

- *Query Slot:* Gives a valid feedback for a used slot, and invalid for an empty one. This function continues in operation until an invalid note is played.
- *Copy Track:* The first input is the source, the second the destination of the copy. Fails if the source does contain a track.
- *Save Sequence:* Only uses slots 1 - 16. Fails if the current sequence has not been flattened.
- *Load Sequence:* Only uses slots 1 - 16. Fails if one of the referenced tracks has been deleted. It will also load the incorrect data if a track has been overridden.
- *Pull Track:* Overrides any track data stored at the slot with the one loaded from flash.
- *Flatten Track:* Overrides any track data stored in flash with the memory bank track.
- *Delete Saved Tracks:* Deletes the data of a track stored in flash at the selected slot. This function continues in operation until an invalid note is played.
- *Bank This Track:* Overrides any track data stored at the slot with the one from the current track.
- *Save This Track:* Overrides any track data stored in flash with the one from the current track.

3.2.4 Menu Input

Bar Size uses the number inputs described in **2.2.3** to set their value. The operation is cancelled if no input is provided, rather than using the last inputted value. It has a maximum of 3 digits, and the value is clamped to a minimum of 1 instead of triggering a Fail menu feedback upon invalid input.

3.2.5 Playing Menu

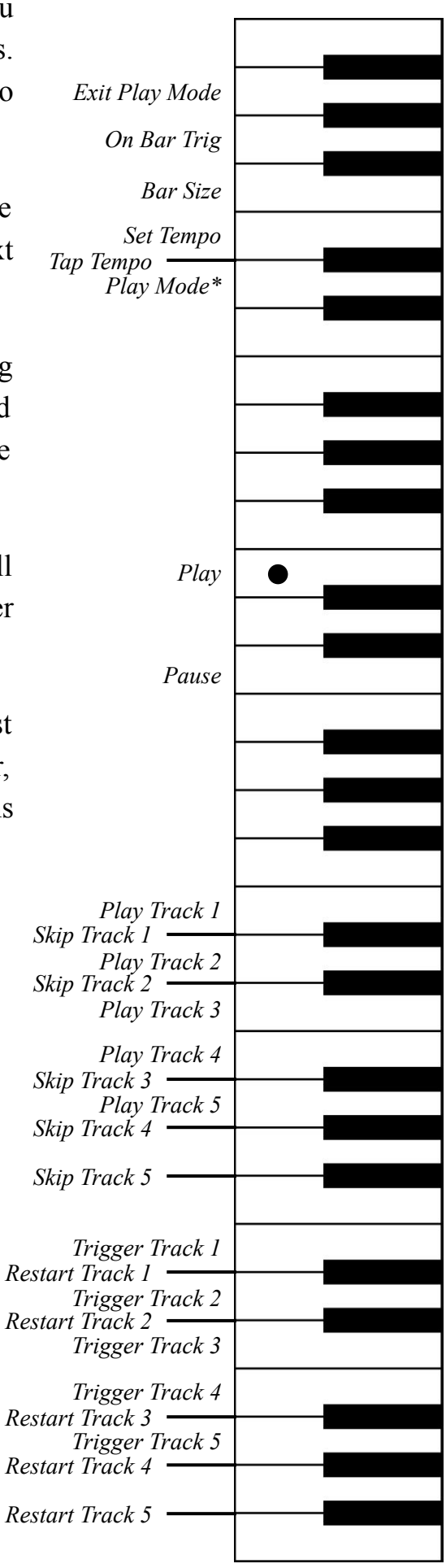
Whilst the sequencer is playing, many of the menu functions become unavailable until playing stops. The ones that can be used however are displayed to the left.

When *On Bar Trig* is enabled, any sequencer value that is set will not actually be applied until the next bar.

If a track was started with *Trigger Track X*, pressing *Play Track X* will disable the play once mode and let it continue. A second press will then cause the track to stop.

When setting a new *Bar Size*, the bar triggers will continue counting from the point it changed, rather than the very start of the play sequence.

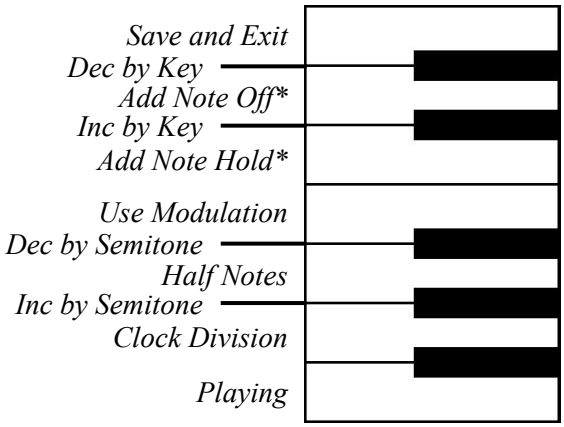
If *Skip Track X* is incremented or has a value whilst *Restart Track X* is going to trigger on the next bar, the skip count is reset back to 0. Note this happens generally when *Restart Track X* is pressed.



3.3 Managing Tracks and Sequences

3.3.1 Track Menu Layout

The track menu is used when creating or editing tracks. The key assignments in the menu apply to every octave, so the image only shows one. Some functions are only available when creating a track (marked with *).



- *Save and Exit* saves the data and attempts to exit the menu.
- *Dec by Key* uses the number inputs to select a key and then a negative offset to apply to every note in the track (see **3.3.4**).
- *Add Note Off** adds a single rest into the sequence.
- *Inc by Key* uses the number inputs to select a key and then a positive offset to apply to every note in the track (see **3.3.4**).
- *Add Note Hold** extends the length of the previous note by one semiquaver.
- *Use Modulation* specifies whether the mod wheel data recorded during track creation should be used during play.
- *Dec by Semitone* uses the number inputs to select a negative semitone offset to apply to every note in the track (see **3.3.4**).
- *Half Notes* sets the track to turn off the note half a semiquaver before the next note is played.
- *Inc by Semitone* uses the number inputs to select a positive semitone offset to apply to every note in the track (see **3.3.4**).
- *Clock Division* changes the number of semiquavers each note in the track is equal to (see **3.3.4**).
- *Playing* specifies whether notes in the track should be outputted.

3.3.2 Default Track Values

The default values of all the track settings when a new track is created are shown below.

Option	**Value**	**Option**	**Value**	**Option**	**Value**
Use Modulation	OFF	*Half Notes*	OFF	*Clock Division*	1
Playing	ON				

3.3.3 Using the Track Menu

When a track is created using *Create Track*, the user first has to select the slot that the new track will be saved to. Any track saved here will not be overridden until the sub menu is closed and the new track was valid. The user then has to press 2 notes to designate the range of input values. This is an inclusive range where notes will added to the track. Notes outside this region will trigger the functions outlined in **3.3.1**. Once those are complete, the next notes will then either enter values into the track, or change parameters.

When a track is created using *Create Track Seq*, the process is the same but without selecting a save slot first.

When the track menu is entered using *Edit Track*, a valid track slot must be entered before the track menu can be used. The user must continually press notes until a track slot containing a track is pressed.

When the track menu is entered using *Edit This Track*, the menu is opened immediately, as no slot needs to be selected.

When exiting the menu, the track must contain at least 4 notes, otherwise it is an invalid track. A Fail menu feedback is triggered and the menu is not closed. Changing a resetting switch (see **1.1**) can force an exit, where a failure cancels the track creation and no data is overridden. Upon successful exit, the track is created and stored where assigned.

When adding notes, the note is played as feedback if it is entered, *Add Note Off* playing the Other menu feedback and *Add Note Hold* playing the last entered note or Other menu feedback if the last note was a rest.

A track can contain up to 256 notes, including holds and rests. Any further note inputs will result in a Fail menu feedback and the operation is ignored. The *Key Filter* described in **2.1** also applies to notes added, where notes that are not included in the key are ignored and no feedback is provided.

3.3.4 Menu Input

Clock Division, *Inc* and *Dec* all use the number inputs described in **2.2.3** to set their value. *Clock Division* is up to 3 digits and must be in the range 1 - 255 inclusive, otherwise it triggers a Fail menu feedback and the value is not set (see **2.2.1**).

Inc/Dec by Semitone is also up to 3 digits but must be less than or equal to 127. The input value is applied when more than 3 digits have been entered, or an invalid note is pressed, and the number inputs is closed.

Inc/Dec by Key behaves the same as its semitone counterparts, but a key is selected first before entering numbers. This is the same as the *Select Filter* in **2.1**, using C1 - B1 to choose a major key. Alternate modes can be selected following the key chart in **6.1**.

3.3.5 The Sequence Menu

The sequence creating menu is far simpler than the track one. Once opened, each note A0 - D5 corresponds to a track slot as it does in **3.2.3**. Tracks are then added to the sequence in the order that they are entered. Each track can be repeated up to 255 times in a row before it becomes a track change, and there can be up to 256 track changes in the sequence. Attempting to add any more results in a Fail menu feedback (see **2.2.1**).

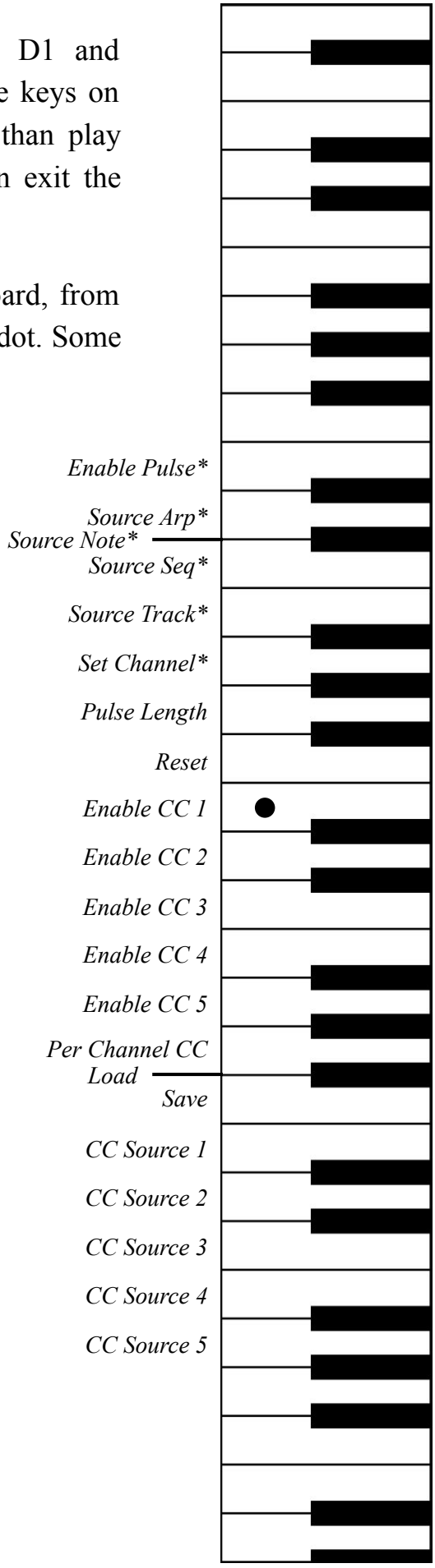
When loading tracks, the memory bank is prioritised. If no track is stored at that slot, then the track saved in flash is loaded instead. If there are no tracks stored at either spaces, a Fail menu feedback is triggered and no tracks are added to the sequence.

Pressing G5 toggles between loading from flash only or not. But by default the menu opens with this OFF. The sequence can be saved and the menu closed by pressing B5. If the sequence contains no tracks, the Fail menu feedback is triggered and the menu is not closed. Changing a resetting switch (see **1.1**) can force close the menu, where a failed exit results in no changes to any of the sequences.

4.1 Programmable Ports Menu Layout

To access the programmable ports menu, press D1 and change one of the resetting switches (see **1.1**). The keys on the keyboard will now change parameters rather than play notes. Changing a resetting switch again will then exit the menu.

To the left displays a portion of a full sized keyboard, from A1 to D#6. C4 (middle C) has been marked with a dot. Some options are channel specific (marked with *).



- *Enable Pulse** enables pulsing on the ***OPT*** output equivalent to the inputted channel.
- *Source X** sets the source of the pulse to be on triggers caused by *X*.
- *Set Channel** uses the number inputs to set the source channel for the pulse (see **4.2.4**).
- *Pulse Length* uses the number inputs to set the length in milliseconds of each pulse (see **4.2.4**).
- *Reset* sets all values in the menu to their default (see **4.2.1**).
- *Enable CC X* enables the programmable port for ***OPT*** slot *X* or channel *X* depending on *Per Channel CC*.
- *Per Channel CC* causes the ports to be per channel and aligned with the slot allocations (see **1.2.1**).
- *Load* loads the settings saved in flash.
- *Save* saves the current settings to flash. These will be loaded on startup.
- *CC Source X* uses the number inputs to set the Midi CC that the ***OPT*** port *X* listens to (see **4.2.4**).

4.2 Programmable Port Functions

4.2.1 Default Values

The default values of each configuration option are shown in the table below. These are the values set when *Reset* is pressed. The values loaded on startup however are the ones stored in flash after *Save* in pressed.

Option	**Value**	**Option**	**Value**	**Option**	**Value**
Enable CC X	OFF	*Per Channel CC*	OFF	*CC Source X*	0
*Enable Pulse**	OFF	*Source**	Seq	*Channel**	1
Pulse Length	10ms				

4.2.2 Port Allocation

When *Per Channel CC* is disabled, the *Enable CC X* will be per ***OPT*** slot, but with it enabled, the *X* will represent the channel instead. *CC Source X* is also initially per slot but becomes per allocated channel space when *Per Channel CC* is enabled. The CC output overrides the ***MOD/VEL*** switch on the panel.

When setting the pulse values, the channel number which is used to set the value equates to the slot number that it sets, regardless of what slots that channel is allocated.

4.2.3 Pulse Operation

Each pulse is ***OPT*** slot specific, and the output overrides all other uses of that slot. The pulse channel represents the listening channel of the pulse, ignoring *All Channels*, and is not used when the source is set to the sequencer.

4.2.4 Menu Input

CC Source X, *Set Channel* and *Pulse Length* all use the number inputs described in **2.2.3** to set their value. For *CC Source X* the valid range is between 0 - 127 inclusive, so only a maximum of 3 digits can be entered. If a value outside the range is attempted, the Fail menu feedback will be triggered on close rather than Selection (see **2.2.1**).

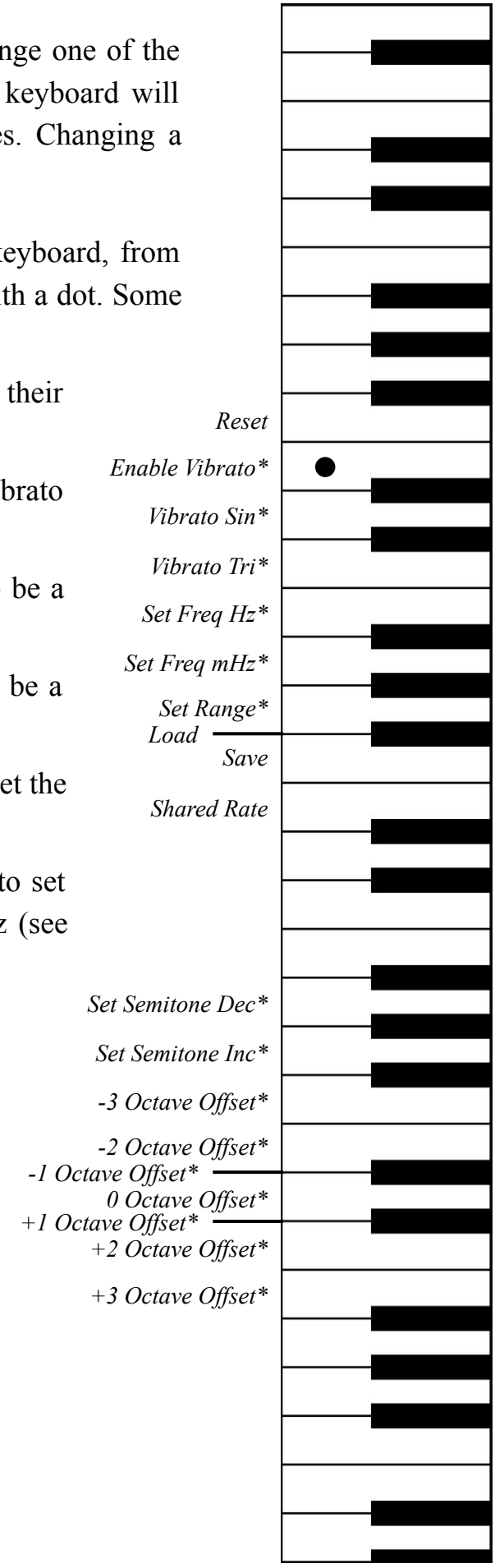
Set Channel is 1 digit and can only be in the range 1 - 5 inclusive. *Pulse Length* is up to 4 digits and can be any number other than 0.

5.1 Vibrato Menu Layout

To access the vibrato menu, press C1 and change one of the resetting switches (see **1.1**). The keys on the keyboard will now change parameters rather than play notes. Changing a resetting switch again will then exit the menu.

To the left displays a portion of a full sized keyboard, from A2 to D#7. C4 (middle C) has been marked with a dot. Some options are channel specific (marked with *).

- *Reset* sets all values in the menu to their default (see **5.2.1**).
- *Enable Vibrato** enables/disables the vibrato for that channel.
- *Vibrato Sin** sets the vibrato function to be a sine wave.
- *Vibrato Tri** sets the vibrato function to be a triangle wave.
- *Set Freq Hz** uses the number inputs to set the frequency of the vibrato (see **5.2.4**).
- *Set Freq mHz** uses the number inputs to set the frequency of the vibrato in milli Hz (see **5.2.4**).
- *Set Range** uses the number inputs to set the pitch range of the vibrato (see **5.2.4**).
- *Load* loads the settings saved in flash.
- *Save* saves the current settings to flash. These will be loaded on startup.
- *Shared Rate* causes all channels to use the vibrato function and frequency of channel 1.
- *Set Semitone Dec** uses the number inputs to set the negative semitone offset for that channel (see **5.2.4**).



- *Set Semiton Inc** uses the number inputs to set the positive semitone offset for that channel (see **5.2.4**).
- *X Octave Offset** sets the octave offset for that channel to *X*. This is a separate offset to the ***OCTAVES*** switch on the panel.

5.2 Vibrato Functions

5.2.1 Default Values

The default values of each configuration option are shown in the table below. These are the values set when *Reset* is pressed. The values loaded on startup however are the ones stored in flash after *Save* in pressed.

Option	**Value**	**Option**	**Value**	**Option**	**Value**
*Enable Vibrato**	OFF	*Vibrato Func**	Sin	*Frequency**	4 Hz
*Range**	43	*Shared Rate*	OFF	*Semitone Offset**	0
*Octave Offset**	0				

5.2.2 Vibrato Operation

With *Shared Rate* disabled, each vibrato operates per allocated channel, not per channel input if *All Channels* is enabled (see **2.1**). The vibrato works by offsetting the pitch bend for each slot output. The pitch wheel can still be used at the same time, but if the sum of the pitch wheel and vibrato exceed an offset of one octave, the vibrato function will be clipped to stay within those bounds. This is a hardware limitation of the module.

When *Shared Rate* is enabled, all channel's vibratos are in sync, and use the settings of the channel one vibrato.

As the frequency of the vibrato increases, the accuracy and smoothness of the function will decrease, as the module has a limited output rate.

The *Range* setting does not align with any normal units for pitch and actually represents the peek value rather than total range. The scale fits such that 2048 represents +/- one octave. So the default of 43 roughly equates to a maximum offset of ¼ of a semitone.

5.2.3 Per Channel Offsets

This menu also includes options to add an offset to any channel in addition to the ***OCTAVES*** switch on the main panel. This applies across the entire module, meaning any sequence or arpeggio will also have these offsets applied when playing notes. Note offsets are used per channel input, rather than channel output. So with *All Channels* enabled, different channels can have different offsets even though they output to the same channel.

5.2.4 Menu Input

With *Shared Rate* enabled, setting the function or frequency of the vibrato on any channel sets the respective parameter for channel one. All channels then use those values for their vibrato.

Set Freq/Range/Semitone uses the number inputs described in **2.2.3** to set their value. Each setter stores its own last value that is used if no digits are entered. This includes *Set Freq Hz* and *Set Freq mHz* as having different last values, but *Set Semitone Inc* and *Set Semitone Dec* share the same last value.

Set Freq Hz has up to 3 digits, *Set Freq mHz* has up to 5, *Set Range* has up to 4 and *Set Semitone X* has up to 2. The valid range for frequency inputs is anything greater than 0. *Set Range* has a maximum value of 2048, and *Set Semitone X* has a maximum value of 24. Note that entering a value larger than 65535 into *Set Freq mHz* will have undefined behaviour; the actual set value will not be that which is expected.

Set Semitone Inc and *Set Semitone Dec* are not added together, rather one causes the offset to be positive and the other to be negative. This was just to save adding a negative key to the number inputs.

6.1 Key Chart

When selecting keys in the module, only the major of the pressed note is used. To get different modes a corresponding note can be pressed which has all the equivalent notes in its major key. The table below shows the note to press to get each modal key.

Key	Major	Minor	Dorian	Phrygian	Lydian	Mixolydian	Locrian
C	C	D#/Eb	A#/Bb	G#/Ab	G	F	C#/Db
C#/Db	C#/Db	E	B	A	G#/Ab	F#/Gb	D
D	D	F	C	A#/Bb	A	G	D#/Eb
D#/Eb	D#/Eb	F#/Gb	C#/Db	B	A#/Bb	G#/Ab	E
E	E	G	D	C	B	A	F
F	F	G#/Ab	D#/Eb	C#/Db	C	A#/Bb	F#/Gb
F#/Gb	F#/Gb	A	E	D	C#/Db	B	G
G	G	A#/Bb	F	D#/Eb	D	C	G#/Ab
G#/Ab	G#/Ab	B	F#/Gb	E	D#/Eb	C#/Db	A
A	A	C	G	F	E	D	A#/Bb
A#/Bb	A#/Bb	C#/Db	G#/Ab	F#/Gb	F	D#/Eb	B
B	B	D	A	G	F#/Gb	E	C